conception beautiful; the most delicate embroidery could not rival them in their wonderful variety and complexity. The surface within and without is covered over with little tubercles of silica, which have a smooth, enamelled appearance like the most delicate pearls; down on the sides of the basin are large rounded masses like corals, formed entirely of silica. There are probably from twenty to fifty geysers of greater or less importance in this valley.

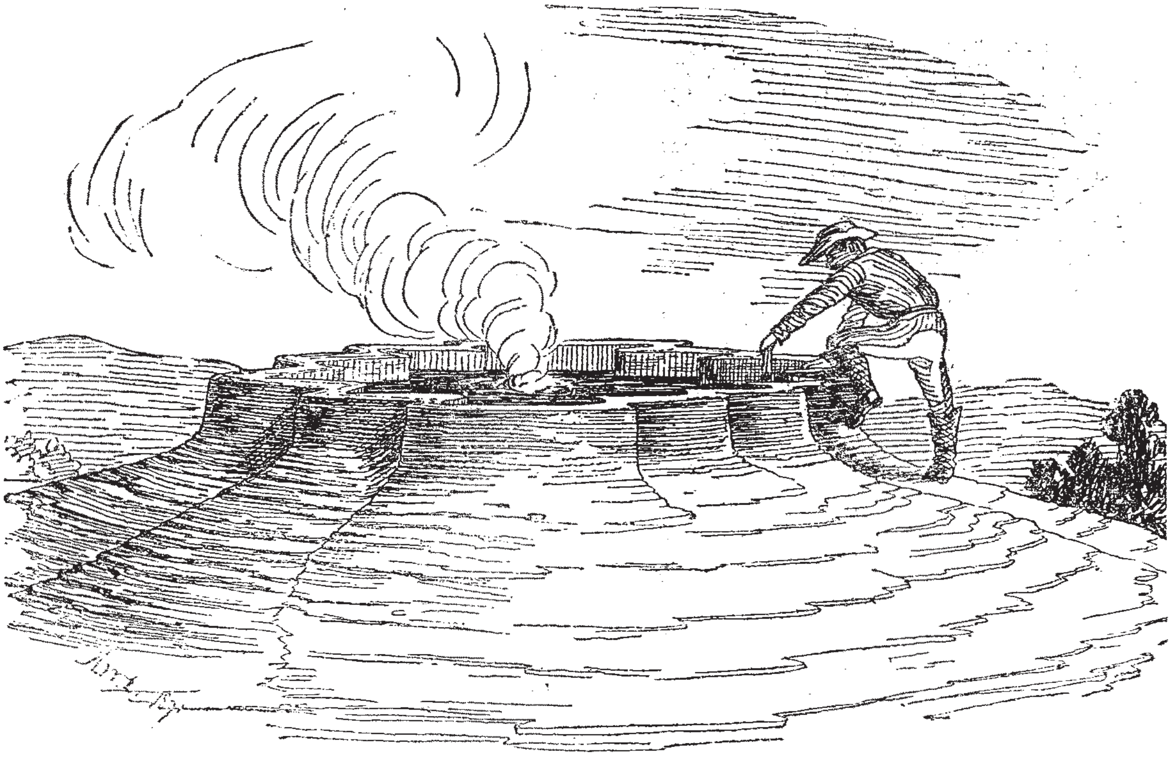

Fig. 8.—White Mountain Springs.

The two kinds of deposits in these regions, the calcareous and siliceous, have been mentioned in the preceding description. According to analysis by Dr. Peale, Chemist of the U. S. Geological Survey, the springs on Gardener's River, known as the White Mountain Springs (Fig. 8), deposit carbonate of lime mostly. There is present also sulphate of magnesia, chloride of calcium, sulphate of soda, and a little silica. In the deposits of the Firehole Basin not a trace of lime could be detected, but about 85 per cent. of silica, 11 per cent. of water, and the remainder mostly chloride of magnesium, and only a slight trace of lime has been found in the water. There are, scattered over the great area, a few patches of the sedimentary rocks, and it is most probable that underneath the deposit of this small group of springs there are portions of the carboniferous limestone.

So far as Mr. Hayden and party could ascertain, in all the deposits of the Yellowstone Basin proper, and the Firehole Basin, silica is the dominant constituent. The springs are, with very few exceptions, near the borders of the streams below beds of limestone. It is possible that underneath the vast masses of volcanic material which compose the mountains on every side, the sedimentary rocks exist; but Mr. Hayden is disposed to believe that they occur only in isolated and much restricted patches, if at all.

It may therefore be stated, in general terms, that the great hot-spring region of the Yellowstone and Missouri rivers is covered with rocks of volcanic origin, of comparatively modern date.

NOTES

At their Statutory Quarterly Meeting on Monday, the Trustees of Anderson's University, Glasgow, elected Mr. George Forbes, B.A., F.R.S.E., of St. Catherine's College, Cambridge, to the vacant professorship of Natural Philosophy. There were originally eleven candidates for the appointment, but one of them died before the day of election arrived. Prof. Forbes is by inheritance, as well as by inclination and education, a man of science. The son of the late Principal, James D. Forbes, F.R.S., of St. Andrews, he received his university training at St. Andrews, Edinburgh, and Cambridge, and has since had the benefit of practical training in physical science at the Royal Observatory under the Astronomer Royal, and on the Continent. In making the appointment, the Andersonian trustees acted on the advice of Sir Wm. Thomson, Sir G. Biddell Airy, K.C.B.; Prof. P. G. Tait, Edinburgh; Prof. Balfour Stewart, Prof. A. S. Herschel, Profs. W. H. Miller and J. C. Adams, Cambridge; Prof. Grant, Glasgow Observatory, and other eminent physicists. It is understood that this professorship is to be established on a more extensive basis than formerly. This would offer to the professor a wider field of useful employment by developing the resources of the professorship, not only through the extension of the system of lecturing, but also by the establishment of a physical laboratory for students, which, it is understood, is in contemplation. Mr. Alexander Lindsay, of Glasgow, has also been elected Professor of Medical Jurisprudence. It was intimated to the meeting that Mr. J. Tennant, of Rollox, has given a donation of 1,000*l.* to the University.

The following lectures on subjects connected with Physical and Medical Science will be delivered at the University of Cambridge in the Michaelmas Term :—"Heat and Electricity," by the Professor of Experimental Physics (Mr. Maxwell), on Mondays, Wednesdays, and Fridays, at 12 M.; begin October 23. "Chemistry," by the Professor of Chemistry (Mr. Liveing), on Mondays, Wednesdays, and Fridays, at 12 M.; begin October 21. "Practical Chemistry," by the Professor of Chemistry, on Mondays, Wednesdays, and Fridays, at 1 P.M.; begin November 4. "Zoology and Comparative Anatomy," by the Professor of Zoology and Comparative Anatomy (Mr. Newton), on Mondays, Wednesdays, and Fridays, at 1 P.M.; begin October 21. "Anatomy and Physiology," by the Professor of Anatomy (Dr. Humphry), on Tuesdays, Thursdays, and Saturdays, at 1 P.M.; begin October 22. "Practicar Anatomy," by the Professor of Anatomy and the Demonstrator of Anatomy (Dr. Wilson), at 9 A.M. daily till October 21; afterwards on Mondays, Wednesdays, and Fridays; begin October 7. "Materia Medica and General Therapeutics," by the Downing Professor of Medicine (Dr. Fisher) or his deputy, on Tuesdays, Thursdays, and Saturdays, at 9 A.M.; begin October 22. "Clinical Medicine," by the Regius Professor of Physics (Dr. Paget), on Mondays, Wednesdays, Thursdays, and Fridays, at 10 A.M.; begin October 10. "Clinical Surgery," by C. Lestourgeon, M.A., on Tuesdays and Thursdays, at 11 A.M.; begin October 22. Attendance on the lecture on Botany, Chemistry, Materia Medica, Anatomy, Physiology, and Dissections is recognised by the Royal College of Surgeons, England, as one of the sessional courses required by the regulations of the Council of that College.

WE understand that Mr. Darwin's new work on "Expression in Animals," a subject to which he has devoted great attention, will shortly be published in this country, as well as a German translation by Dr. Carus.

LORD CATHCART, the President of the Royal Agricultural Society, has offered a prize of 100*l.* for the best essay on the causes and remedy for the potato disease.

ON Saturday morning a conference was held in St. Thomas Charterhouse Schools to inaugurate a system of Science Teaching for Elementary School Teachers. The Rev. Evan Daniel, Principal of Battersea Training College, was voted to the chair, and there was a very large attendance of teachers of both sexes. The chairman spoke strongly of the necessity of immediately starting an institution for the efficient teaching of science. On all sides, he said, there was an outcry for it. All provisions hitherto made by the Government for the teaching of science were wholly inadequate. The school is to be known as the St. Thomas Charterhouse School of Science, and its programme for the ensuing session, which commenced on Monday evening last, shows that, in addition to the evening classes, there will be day classes for general students. The subjects include chemistry, geology, mathematics, animal physiology, acoustics, vegetable anatomy and physiology, magnetism and electricity, botany systematic and economic, plane and solid geometry, music, &c. Several professional lectures will be given during the session, and biology students will have opportunities of making microscopical observations. Any communications or inquiries should be addressed to Mr. C. Smith, the organising teacher.

THE Royal Microscopical Society will hold its first meeting for the session on Wednesday, Oct. 2, at King's College, at 8 P.M.

CAPTAIN BURTON, who has been exploring the unknown interior of Iceland, has returned to England. His collections, &c., we believe, are at present left in the care of the Anthropological Institute, London, as he had to leave England at once in order to take up his appointment as Consul at Trieste, to which he was appointed on the death of the late Mr. Charles Lever.

THE Academy of Sciences of Bologna has resolved to give in 1874 a prize of 1,200 francs *(prix Aldini)* for the best scientific experimental essay on Galvanism or Dynamic Electricity. The competition remains open till June 30, 1874; the works may be either written or printed, but in the latter case they must not be published before 1874; and then they may be written either in Italian, Latin, or French.

THE Academy of Sciences of Vienna instituted in 1869, for the purpose of encouraging astronomers to search for comets, eight special prizes, which it has kept up each year since as part of its programme. Each of these prizes consists of a gold medal of the value of 20 Austrian ducats (between 9*l.* and 10*l.*) They are intended to reward observers who discover a telescopic comet, or a comet visible only by telescope at the time of its discovery. One condition is that the comet has not previously been seen, and that its appearance has not been previously proved with certainty. The discovery should be immediately announced to the Academy by telegraph or otherwise without waiting for further observations, the Academy undertaking to notify at once to the different observatories the fact of the discovery. The place and time of the discovery ought to be indicated, as well as the position of the comet and its orbit as exactly as possible with the first intimation; the data should be completed at leisure by further observations if it be possible to make them. When the comet has not been seen by other observers, the prize will be presented only when the observations of the discoverer have been sufficient to enable the orbit to be determined. The prizes are decided each year at the general meeting of the Academy held at the end of the month of May. If the first announcement of the discovery reaches the Academy between March 1 and May 31, the prize cannot be decided till the following year.

THE Society of Science and Arts of Utrecht offers prizes for papers on the six following subjects:—1. Experimental Researches upon the Inhibitory Nerves. The author must not restrict himself to a mere critical review of existing opinions on the subjects; he must elucidate them by new experiments. 2. Researches on the development of one or more species of invertebrate animals whose history is not yet known; the paper must contain all the illustrations necessary to the understanding of the text. 3. Researches upon the influence which slight variations of external circumstances may exercise upon the evolution of the embryo of one or more species of invertebrate animals. 4. Description of the larva and nymph of the common cockchafer, to complete the monograph on that insect in its perfect state by Strauss-Durckheim. This must be accompanied by the necessary figures. 5. Researches to determine the normal variation of the temperature of at least thirty-five places in the northern regions of Europe. The monthly means of old observations ought to be reduced so as to agree with the time at which the observations are actually made. 6. To investigate and point out how the waters of the rivers which traverse the Netherlands could be purified so as to become drinkable without detriment to the public health; at the same time to indicate the probable expense of their application on a large scale. Each of the prizes will consist of a medal of the value of about 27*l.* sterling, or its equivalent in money. The papers may be written in French, Dutch, German (Roman letters), English or Latin. They ought to be sent to the Secretary of the Society, M. N. F. Van Nooten, before December 1, 1873, the name and address of the author ought to be attached to each memoir in a sealed envelope.

DEMERARA papers record the death, in the early part of the summer, of Mr. C. F. Appun, an enterprising naturalist who had done much to explore both the physical features and the natural productions of the colony. He had previously travelled through Venezuela, Brazil, and the Amazons Valley, and had sent considerable collections of plants both to this country and to Germany. His journal has been printed in the *Georgetown Gazette*, and we hope to give extracts from it on a future occasion.

THE Council of the Vienna Exhibition have decided on having a permanent aquarium erected in that city, and the plans of Mr. H. Driver, C.E., who erected the aquarium at the Crystal Palace last year, have been approved.

WE understand that it is not the intention of the Board of Managers of the London Institution to fill up the vacancy occasioned by the decease of Mr. J. C. Brough, F.C.S. until after November.

THE *Newcastle Chronicle* states that some gentlemen connected with the mining interest have for several days been prosecuting their inquiries in the neighbourhood of Waterford with reference to the existence of coals in that portion of county Kilkenny which lies between the Suir and the Barrow, and has a communication with both of these important rivers. The geological maps give no indication of coals in this locality, but the result of inquiries prosecuted with much intelligence has led to the discovery of a coal bed of immense dimensions in this district, about two miles from Waterford, and within easy access to the river Suir. The coal seam to the thickness of 10 ft. lies immediately under the Old Red sandstone, the lower strata being a very fine outcrop of silicate of magnesia. The coal shales come to the surface at the cross road, about half a mile beyond the chapel of Sheverne. The arrangements are in a state of great forwardness for an immediate start, and a number of English miners are daily expected. If the hopes of these parties—and they appear to be well founded—are realised, it will afford a vast amount of employment, and will give the south of Ireland an almost unlimited supply of fuel. We need hardly point out that our Newcastle contemporary must have fallen into an error in speaking of the coal-seam being found *under* the Old Red sandstone.

WE are glad to see that Professor Piazzi Smyth, Astronomer Royal for Scotland, has at last got the reward of his twenty years' persevering and creditable importunity in the shape of a new equatorial telescope for the Royal Observatory on the Calton Hill, Edinburgh, for which Government last year granted 2,300*l*. Hitherto, as the *Scotsman* justly remarks, the Metropolitan Observatory of Scotland has been in the position of the meanest appointed Government astronomical institution in Scotland. To accommodate the new telescope, it is necessary to raise the dome of the Observatory, and Mr. James Fergusson, author of the "History of Architecture," who was consulted on the matter, has decided that the new dome could not be raised more than fourteen inches—that being the largest increase that could be æsthetically allowed in conjunction with the rest of the Observatory, which, viewed as a piece of architecture, is considered to be the very gem of the works of the late William Playfair. In consequence of this the Astronomer Royal has had a difficult task in endeavouring to arrange a form of equatorial instrument which would give a greater amount of power within a smaller line or compass than was ever attained before. The new telescope will have an aperture of two feet upon a focal length of only ten feet—a larger diameter in proportion to focal length than any astronomical telescope yet introduced into any observatory; and it will no doubt be by far the most powerful instrument ever erected under so small a dome. Although the telescope will be much more powerful than any ever before placed in the Observatory, it is still not such as was desired or considered almost necessary in the present state of science. The instrument, which is being built by Mr. Howard Grubb of Dublin, is to be constructed on M. Foucault's comparatively new principle of having the speculum of glass coated with pure silver. The instrument is to be employed both for photography and spectroscopy. Both these classes of research require the seemingly impossible accompaniments—that the telescope must have the utmost amount of firmness, and also have the most accurate possible movement at the same rate at which the stars change their position in the sky. Notable features in the new telescope will therefore be the remarkably perfect clockwork apparatus, the several devices connected with the prisms of the spectroscope, the means by which not merely celestial objects will be kept in view, but those by which the rays of chemical flames will be brought into comparison with the light of the stars. The extremely delicate measuring apparatus to be applied to the respective subjects as they appear on the spectrum will also be noteworthy. December next is the time fixed for the completion of the new instrument, but meanwhile active preparations are being made in the Royal Observatory for its reception. The new dome, it is expected, will be erected in the course of this month, while the weather is yet fine. This dome, which is also being built by Mr. Howard Grubb, will be of iron instead of wood, and that for two reasons: first, because it will afford a greater amount of space in the interior of the instrument room; and second, because it will enable such an arrangement being made for the shutter as will allow of an opening several feet in breadth, whereas the opening in the old dome was only a few inches wide. Although the arrangements of the Observatory are, during operations, necessarily somewhat upset, observations continue to be made by Prof. Piazzi Smyth and his assistants.

IN accordance with the decision of the Scientific Association of France, systematic and simultaneous observations on shooting stars have been made during August in various places in France, Italy, and at Alexandria. The chronometers of the various stations were compared by telegraph, the signals being given from Bordeaux, Lyons, Marseilles, and Paris. The results of the simultaneous observations at the various stations are recorded in the *Bulletin Hebdomadaire*, from which we learn that on the nights of August 9, 10, and 11, observations were made at twenty-two stations; Alexandria and Moncalieri being those from which the greatest number of shooting stars were seen, 2,042 having been noticed during the three nights at the former, and 2,049 at the latter place. It will be remembered that in November last the whole of the shooting stars did not come from Leo, as it was expected they would, and that the observers noticed radiant points in Taurus, Gemini, &c. Somewhat similar eccentricities, though upon a less scale, appear to have occurred during the August shower. At Genoa, about the half of the stars came from various directions; M. Stephan, at Marseilles, intimates that on the third night the radiant point was in Cygnus; and at Paris, M. Tremeschini found that on the third night the majority of the stars did not come from Perseus. MM. Le Verrier and Wolf, who have been charged with the arrangement of the various observations, have presented to the Academy the results of the work done last November, and expect to be able to do the same for that of August, soon after they receive detailed reports from the various observers. For the discussion of the common observations, the astronomers at their meeting at Montpelier decided to employ the method proposed by Colonel Goulier, which however can be applied only when the stars are at least 10° above the horizon; when otherwise, the methods followed by MM. Lespiault and Stephan will be used. M. Goulier has been charged with the construction of the charts of his system; M. Lespiault with the preparation of the method to be followed when the trajectories are at a small elevation above the horizon; and M. Wolf with the final arrangement of the complete results.